
Rubiacearum Americanarum Magna Hama Pars XXII: Notable New Species of South American *Coutarea*, *Morinda*, *Patima*, and *Rosenbergiodendron*

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ABSTRACT. Although *Appunia* Hook. f. has been synonymized by some recent authors with *Morinda* L., it is here provisionally recognized as a Neotropical genus, with the new species *A. megalantha* C. M. Taylor & Lorence found in wet lowland forests of northwestern Colombia, northern Peru, and perhaps Ecuador and easily separated from other species of *Appunia* by its climbing habit and relatively large corollas with six lobes. Two new species of *Coutarea* Aubl. with actinomorphic corollas expand its known diversity in seasonal and dry inter-Andean valleys, with *C. coutaportloides* C. M. Taylor of southwestern Ecuador and *C. fuchsoides* C. M. Taylor of northeastern Peru both similar to *C. andrei* Standl. A second species of *Patima* Aubl., *P. minor* C. M. Taylor (Hamelieae) from Guyana, doubles the number of species known and expands the morphological variation in the genus to include 4-merous flowers. A fourth species of *Rosenbergiodendron* Fagerl., *R. reflexum* C. M. Taylor & Lorence from Peru, has subglobose fruits and relatively large corollas, ca. 34.5 cm long.

Key words: *Appunia*, Brazil, CCE complex, *Coutarea*, Ecuador, Gardenieae, Guyana, Hamelieae, IUCN Red List, *Morinda*, Morindeae, *Patima*, Peru, *Rosenbergiodendron*, Rubiaceae.

During study of specimens of Neotropical Rubiaceae, the five new species described below were discovered. These species are notable in their expansion of the morphological range, species diversity, and/or biogeography of their respective genera.

The study presented here is taxonomic and floristic: the objective is enumeration of the species that belong to various Rubiaceae genera and the species that occur in the area of tropical Central and South America. The methods employed here correspond only to this objective, with this study based on survey of

specimens collected over a number of years using varied survey methods addressing different questions. The specimens that here outline the range and commonness of these new species were located through a non-exhaustive survey of particular herbaria, and no field studies have been done targeting the occurrence of these species. Thus the floristic information presented here is a simplified presence report based on incomplete survey of the data available for incompletely known regions (Schulman et al., 2007). Knowledge of the range of a species is essential to understanding the threats to its existence and thus to understanding its actual conservation status; no claim is made here to accurately describe the entire geographic range of any of these new species. Knowledge of the existence of a species based only on one or a few collections also does not provide a reasonable estimate of its population size, which is also essential to understanding its actual conservation status. Pro forma conservation assessments are provided here for these newly described species according to IUCN categories (IUCN, 2001) following current taxonomic practices, but these assessments are not rigorous or formally submitted to the IUCN and the basis for these assessments should be carefully evaluated by the reader.

APPUNIA

The genera *Morinda* L. and *Appunia* Hook. f. (Morindeae) are characterized by opposite to verticillate leaves; tissues with raphides; interpetiolar to shortly sheathing, usually persistent stipules; terminal or axillary, bracteate inflorescences with the flowers borne in one or more hemispherical to subglobose heads; bisexual, usually distylous, small to medium-sized flowers; a truncate to sinuate calyx limb; salverform white corollas with four to seven valvate

lobes; a 2- or 4-locular ovary with two axile ovules in each locule of a 2-locular ovary or solitary ovules in each locule of a 4-locular ovary; and fleshy drupaceous fruits with two or four unilocular pyrenes. These genera together include about 90 species of low shrubs to large trees and some woody climbers found in both the New and Old World tropics.

Morinda and *Appunia* are distinguished primarily by the arrangement of their flowers, with those of each inflorescence all fused at the ovary portion and producing a single multiple fruit in *Morinda*, versus the flowers free with each producing a free drupe in *Appunia*. Additionally, these genera have sometimes been separated by their stigmas, two and linear in *Morinda* versus one and clavate in *Appunia*. Steyermark (1972: 384–385) reviewed these genera and noted that paired stigmas are also found in several species with free fruits (e.g., *A. triphylla* Ducke) and that several species have fruits that are “coherent only in their basal half” (e.g., *M. hoffmannioides* Standl.), which he considered to be a condition intermediate between the two genera. Accordingly, Steyermark concluded that the characters used to separate *Appunia* and *Morinda* were continuously variable and not consistently correlated, and he formally synonymized these genera. This conclusion has been followed by most subsequent authors (e.g., Taylor & Pool, 1993; Taylor, 1999; Boom & Delprete, 2002; Taylor et al., 2004). However, this synonymization has not been accepted by some (e.g., Taylor, 2001; Lorence et al., in prep.), who considered the free versus fused flowers and single versus multiple fruits to be clear consistent differences separating these groups and, in contrast to Steyermark, have not observed any species to be intermediate in this feature. The individual fruits of *M. hoffmannioides*, described as “partially fused” or “partially coherent” by Steyermark, appear in our observation to be shortly fused at their bases and to fall (i.e., disperse) as a single unit, although presumably these fruits are eaten by birds and sometimes individual pieces corresponding to the fruit of an individual flower may be pulled off the group. The variation in stigma form has not been carefully re-surveyed, but as shown by Steyermark this character is not correlated with fruit type. Stigma form is variable within other Rubiaceae genera (e.g., *Spermacoce* L.), and therefore does not necessarily seem taxonomically informative for either synonymization or separation of these genera.

Additionally *Bellynkxia* Müll. Arg. was separated from *Appunia* by its solitary ovules distributed in four ovary locules and its four styles. However, Bremekamp (1934) noted this observation was not correct because the ovary of *B. angulata* Müll. Arg., the type

species, actually has two locules with two ovules in each. Bremekamp, however, did recognize *Bellynkxia* as a Neotropical genus of four species distinguished by its unusual inflorescence arrangement, with the leaves in a “false whorl” of three and the inflorescence “extra-axillary” (1934: 276). This arrangement is produced when the terminal inflorescence is subtended by two nodes that are not separated by an internode, with a pair of leaves developing from one node and only one leaf developing from the other, and often with one axillary bud developing to produce a sympodial continuation of the stem and an apparent lateral displacement of the inflorescence. A similar arrangement is found in several other genera of Rubiaceae (e.g., *Duperrea* Pierre ex Pit., *Brachytome* Hook. f.), and, as noted by Bremekamp, this arrangement is also found in some species of *Morinda*. *Bellynkxia* has been considered a synonym of *Morinda* by Steyermark (1967) and subsequent authors (e.g., Taylor et al., 2004).

No published molecular studies have addressed the relationships of these genera. One species of *Appunia* (*A. guatemalensis* Donn. Sm.) and one species of *Morinda* (*M. citrifolia* L.) were included by Bremer and Manen (2000) in their survey of the Rubioideae, comprising a very limited sample. Their analyses showed these two species to be closely related but did not find that they form a clearly monophyletic group, and one of their analyses found *Morinda* to be more closely related to *Caelospermum* Blume than to *Appunia*. *Caelospermum* comprises about 15 species of southeastern Asian and Pacific shrubs and small trees with free, usually pedicellate flowers (Johanssen, 1988).

Therefore, based on the morphological distinctness of these groups in the Neotropics, the lack of strong molecular evidence that *Morinda* and *Appunia* are closely related, and the suggestion from this molecular evidence that the situation may be more complicated than has been recognized, *Appunia* is here provisionally recognized as a separate genus pending pantropical study of this group and the following new species is described in *Appunia*. This new species was discovered during study of the Rubiaceae collections from South America; it is unique in *Appunia* (and also Neotropical *Morinda*) in its lianescent habit and relatively large flowers.

1. *Appunia megalantha* C. M. Taylor & Lorence, sp. nov. TYPE: Peru. Amazonas: Prov. Bagua, Dpto. Imaza, comunidad de Yamayakat, 5°03'S, 78°20'W, 600 m, 9 June 1997, R. Vásquez, A. Peña & E. Chávez 23940 (holotype, USM; isotypes, ETSU, MO). Figure 1.

Haec species a congeneris habitu lianescente atque corolla sat grandi 6-loba distinguitur.

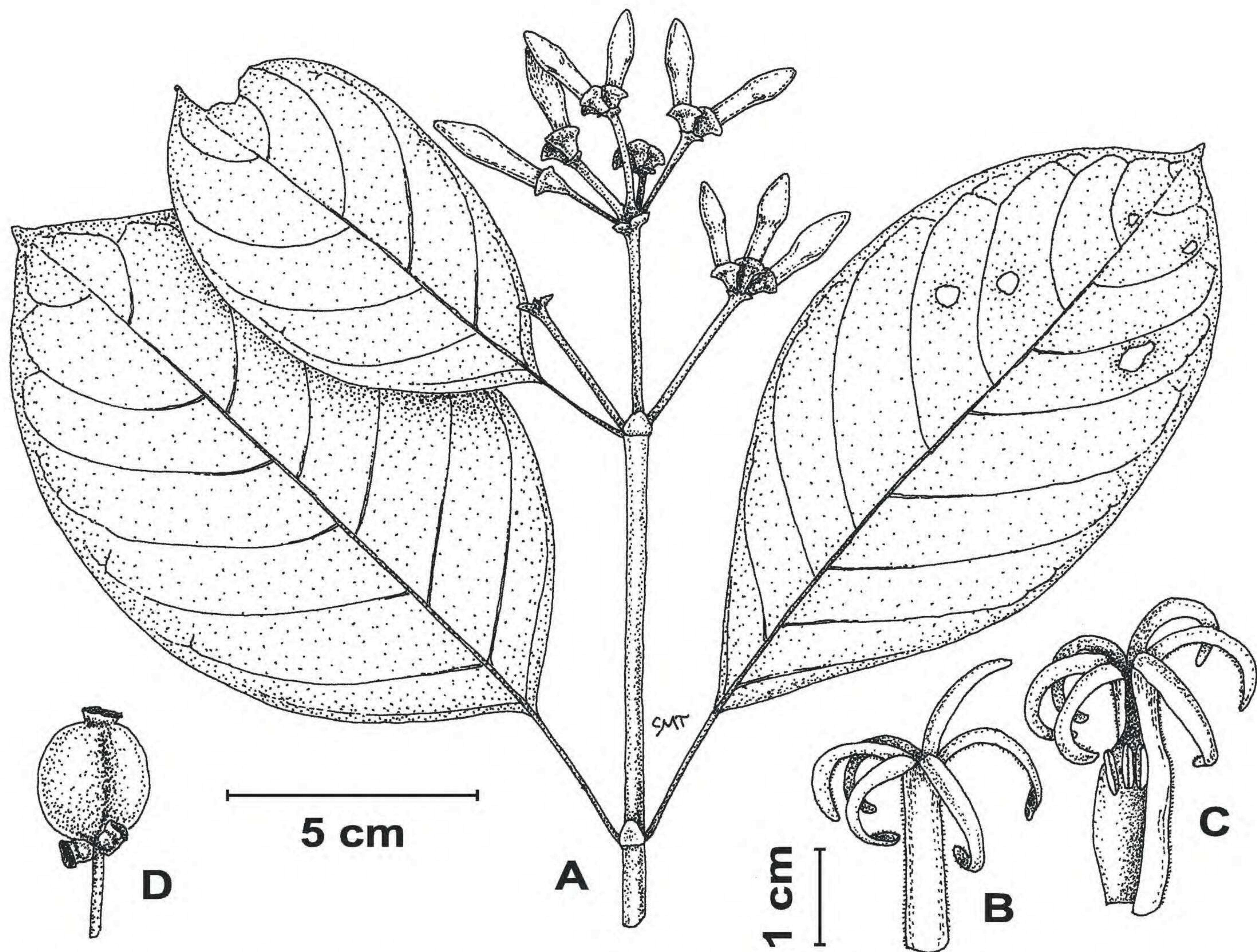


Figure 1. *Appunia megalantha* C. M. Taylor & Lorence. —A. Flowering stem. —B. Corolla at anthesis. —C. Corolla at anthesis, partially dissected. —D. Immature fruit. A–C based on Vásquez *et al.* 23950 (MO); D based on Jaramillo *et al.* 957 (MO); B–D to same 1-cm scale.

Climbing plants, height not noted; stems glabrous. *Leaves* elliptic, 12–15 × 5.5–8.5 cm, apex obtuse to shortly acuminate with the tip to 3 mm long, base cuneate to acute, drying papyraceous to chartaceous and sometimes discoloured, adaxially and abaxially glabrous; secondary veins in 5 to 8 pairs, at least most of them looping to interconnect, in abaxial axils with well-developed pilosulose domatia, adaxially costa and secondary veins plane to prominulous and tertiary venation plane to slenderly sulcate, abaxially costa prominulous to prominent, secondary veins prominulous, and remaining venation visible but plane; *petioles* 20–40 mm, glabrous or sometimes puberulent adaxially at least in 2 lines that connect to base of leaf base; *stipules* persistent, interpetiolar, ovate to broadly ovate, 4–7 mm, acute or obtuse to broadly rounded, glabrous except with margins densely ciliolate. *Inflorescences* terminal and in uppermost leaf axils, paniculate, puberulent to glabrescent; peduncle 1(3), 20–70 mm; branched portion 8–12 × 8–10 cm, with secondary axes 4 to 6 per node, produced at 1 or 2 nodes, each terminating in (1)3 flowers; bracts ovate to triangular, 1–5 mm, acute to obtuse, densely puberulent to glabrous,

with margins densely ciliolate. *Flowers* sessile, free; hypanthium ellipsoid, 2–2.5 mm, densely puberulent; *calyx* limb 2.5–3 mm, funnelform, truncate to irregularly denticulate, with margins densely ciliolate; *corolla* salverform, white, fleshy, externally densely puberulent, internally glabrous, tube 23–24 mm, ca. 3 mm diam. near middle, lobes 6, narrowly triangular, 15–17 mm, apparently triangular in cross section, rounded at apex, abaxially smooth; *anthers* 6, subsessile, narrowly lanceolate, ca. 5 mm, positioned just above middle of corolla tube, without apical appendage; style and stigmas not seen. Immature *fruit* ellipsoid, to 20 × 22 mm, glabrescent, mature color unknown; pyrenes 4, flattened-hemispherical to somewhat discoid, hard.

Distribution, habitat, and phenology. *Appunia megalantha* is known from northwestern Colombia and northern Peru in wet forests at 320–850 m and is presumably present in Ecuador as well. It has been collected in flower in June and in immature but well-developed fruit in January.

IUCN Red List category. This new species is documented so far by four collections from widely

separate localities that are not well known botanically; the occurrence of this species in intermediate sites is expected but currently unknown. If this new species is found in several intermediate regions it can be considered widespread and well established, but if it is confined to the known localities then its population viability may be of concern. Because these considerations counter each other, this species is here considered Data Deficient (DD) according to IUCN Red List criteria (IUCN, 2001).

Discussion. This new species differs from all other species of *Appunia* in its lianescent habit, relatively large fleshy corollas with six lobes, and relatively large fruits; the other species of *Appunia* have fruits generally 6–12 mm long. The specific epithet refers to these relatively large flowers. The discovery of this species increases the number of corolla lobes known in *Appunia*, previously recorded to be four or five.

Paratypes. COLOMBIA. **Antioquia:** Mpio. San Luis, vereda San Pablo, quebrada Carbonera, Finca Aquelarre, 3°N, 75°06'W, R. Fonnegra & W. Rengifo M. 4876 (HUA, MO). PERU. **Amazonas:** Prov. Bagua, Dpto. Imaza, Yamayakat, 4°55'S, 78°19'W, N. Jaramillo, M. Jaramillo & E. Dekentai 957 (MO), 5°03'S, 78°20'W, R. Vásquez, P. Stearn, R. Rojas & R. Aguilar 21612 (MO).

COUTAREA

Ochoterena (1994) studied the circumscription, characters, and relationships of this Neotropical genus and recognized three species of shrubs and small trees found in evergreen, seasonal, and dry forests from Mexico and the Lesser Antilles to Uruguay and northern Argentina. Among Neotropical Rubiaceae with septicidal capsular fruits and winged seeds, *Coutarea* Aubl. can be recognized by its lack of raphides; opposite leaves; generally persistent triangular stipules; terminal, few-flowered, cymose, bracteate inflorescences; 5- to 7-merous flowers; calyx limbs lobed nearly to the base, with narrow lobes that are usually persistent on the fruits; tubular to broadly funnelform, actinomorphic to zygomorphic, white to pink, purple, or red corollas with the lobes imbricate in bud; stamens inserted near the base of the corolla and arranged all together on one side of it, through twisting by the filaments; axile placentation; woody capsules that are generally elliptic to orbicular in outline, strongly flattened perpendicular to the septum, and septicidal from the apex; and numerous, flattened, generally orbicular seeds with a concentric marginal wing. *Coutarea* belongs to a group of genera whose relationships are poorly understood; in recent studies this group has been called the “Catesbaeae–Chiococceae–*Exostema* complex,” or “CCE complex” (Robbrecht & Manen, 2006: 116).

Two species of *Coutarea* have been reported from the central Andean region of Ecuador and Peru, *C. hexandra* (Jacq.) K. Schum. and *C. andrei* Standl. (Taylor & Pool, 1993; Taylor, 1999). Two additional new species from this region are described here, both of which have previously been confused with *C. andrei*. These new species have a similar distinctive growth form, with well-developed main stems that bear paired lateral short-shoots (i.e., brachyblasts). These short-shoots bear most or all of the leaves and inflorescences; a similar growth pattern is found in some other Rubiaceae genera that characteristically grow in dry and seasonal vegetation (e.g., *Randia* L.). One of these new *Coutarea* species has tubular, bright red flowers and is apparently hummingbird pollinated, while the other has broadly funnelform, white to pale flowers and is presumably lepidopteran pollinated; both of these pollination syndromes were previously known in *Coutarea* (Ochoterena, 1994). The addition of these new species expands the morphological diversity known in *Coutarea*, puts the species with the supposedly characteristic zygomorphic corollas now in the minority, and establishes its center of diversity in South America, with one widespread species ranging from there into Mexico. In contrast to most Neotropical Rubiaceae genera, *Coutarea* is found in seasonal and dry vegetation and, with the addition of these new species, shows good representation in this vegetation in the central Andes. A revised key to all of its known species is presented below.

Coutarea andrei, *C. coutaportloides* C. M. Taylor, and *C. fuchsioides* C. M. Taylor can be confused with *Exostema corymbosum* (Ruiz & Pav.) Spreng., a shrub with a similar general aspect and very similar capsules and seeds. *Exostema corymbosum* is found in dry vegetation at 2000–2500 m in central Peru, and can be separated from these three *Coutarea* species by its lack of short-shoots, its entire stipules, and its hypocotyliform corollas that are similar in size and color to those of *C. coutaportloides* but differ in their five narrowly ligulate lobes that are equal to or a little longer than the narrowly cylindrical tube.

KEY TO SPECIES OF *COUTAREA* IN MEXICO, CENTRAL AMERICA, AND SOUTH AMERICA

- 1a. Corollas zygomorphic, curved in the tube, white to pink, with tube funnelform, 19–60 mm long; anthers exserted.
 - 2a. Fruit reddish brown, with lenticels well developed, numerous, and circular; dry forests in Venezuela, Brazil, Bolivia, Paraguay, and Argentina at 120–900 m *C. alba* Griseb.
 - 2b. Fruit gray to brown or black, without lenticels or these few to numerous and elliptic; wet to seasonal forests from Mexico to Argentina at 0–1400 m *C. hexandra*

- 1b. Corollas actinomorphic, straight in tube, pink to red, tubular to funnellform or a little inflated, 16–20 mm long; anthers partly to completely included.
- 3a. Corolla funnellform, white to pink, with tube 12–16 mm wide at mouth (on dried specimens) *C. coutaportloides*
- 3b. Corolla tubular to tubular-funnelform or a little inflated, red, with tube 3–7 mm wide at mouth (on dried specimens).
- 4a. Corolla tubular-funnelform to a little inflated, with tube 4–7 mm wide at mouth (on dried specimens); calyx lobes 5 *C. andrei*
- 4b. Corolla tubular, with tube 3–4 mm wide at mouth (on dried specimens); calyx lobes 7 *C. fuchsioides*

1. *Coutarea coutaportloides* C. M. Taylor, sp. nov.

TYPE: Ecuador. Azuay: rd. from Oña to Cochapata, Km 20.3, 3°25'S, 79°06'W, 2500 m, 24 Oct. 1997, G. P. Lewis & P. Lozano 3650 (holotype, QCNE; isotypes, K, MO 5564858). Figure 2B, C.

Haec species a congeneris floribus fructibusque plerumque a brachyblastis lateralibus productis atque corolla actinomorpha infundibuliformi alba vel pallide rosea tubo 18–20 mm longa distinguitur.

Shrubs flowering at 2–4 m tall; stems flattened to terete, puberulent to glabrescent; lateral short-shoots 0.5–6 cm. *Leaves* subsessile to petiolate, with petioles to 4 mm; blades elliptic to ovate, 15–50 × 6–22 mm, base cuneate to rounded, apex obtuse to acute, drying chartaceous to subcoriaceous, glabrous; secondary veins in 3 to 5 pairs, without domatia, tertiary venation visible abaxially and reticulated or often with some free vein endings; stipules persistent, interpetiolar, triangular, 2–4 mm, puberulent to glabrescent, obtuse to acute, entire or usually glandular-fimbriate with 2 to 6 glands, these 0.1–0.3 mm. *Flowers* 1 to 3 and fasciculate or cymose at stem apices and also sometimes in uppermost leaf axils; peduncles and/or pedicels 1.5–5 mm, puberulent; bracts linear to lanceolate or foliaceous, 1–4 mm, sometimes with glandular margins; ovary narrowly ellipsoid, 3–4 mm, glabrous; calyx limb divided essentially to base, lobes 6, narrowly triangular, 4–5 mm, externally glabrous, internally densely pilosulose, acute; corolla funnellform, pale pink externally, white internally, glabrous throughout, tube 18–20 mm, 12–16 mm wide at mouth (on dried specimens), lobes 6, ovate, 5–7 mm, obtuse; anthers 5, narrowly oblong, ca. 7 mm, with tips exerted for 1–2 mm, filaments inserted at base of corolla, glabrous except pilosulose in lower 1/2; stigmas cylindrical, ca. 3 mm, positioned with anthers, style glabrous, flattened and 2-winged. *Fruits* ellipsoid-oblong, 15–20 × 10–13 mm, strongly flattened, glabrous, with several to numerous promi-

nent round lenticels, with peduncles or stipes apparently elongating as fruit develops, to 15 mm; seeds flattened, suborbicular, 6–8 mm, glabrous.

Distribution, habitat, and phenology. *Coutarea coutaportloides* is known from seasonal to dry disturbed forests and scrub vegetation at 2450–2550 m in southwestern Ecuador. It has been collected with flowers in October and November, and with fruits in April.

IUCN Red List category. This new species is documented so far by three collections from separate localities in the dry and seasonal forests of southwestern Ecuador, which are not well known botanically; the occurrence of this species in intermediate sites is expected but currently unknown. If this new species is found in additional sites it could be considered relatively widespread and well established, but if it is confined to only the known localities, then its population viability may be of concern. Because these considerations counter each other, this species is here considered Data Deficient (DD) according to IUCN Red List criteria (IUCN, 2001).

Discussion. *Coutarea coutaportloides* is distinguished within this genus by its leaves and flowers borne mostly on lateral short-shoots, its rather small leaves (so far as known), and its funnellform, actinomorphic, white to pale pink corollas with the tubes 18–20 mm long. In general aspect and in particular in the size and shape of the corollas, *C. coutaportloides* resembles species of *Coutaportla* Urb. from Mexico and Central America; the specific epithet refers to this similarity. *Coutaportla* is closely related to *Coutarea*, but differs in having two to five ovules per locule and seeds that are unwinged and have a thickened margin, versus 11 to 50 ovules per locule and seeds with thin, well-developed, concentric wings in *Coutarea*.

This new species appears to be deciduous and to produce the flowers together with the new leaves, so conclusively grouping flowering and fruiting specimens is problematic until more specimens are available. The description here of vegetative structures is based primarily on the fruiting paratype collection from El Oro, which has mature leaves and is provisionally included here. These two specimens share glandular-fimbriate stipules and calyx lobes that are pubescent on the adaxial surface; however, occasional sparsely glandular-fimbriate stipules and puberulent to ciliolate-margined calyx lobes are found on some specimens of *Coutarea andrei*, which is found in areas relatively near to *C. coutaportloides*.

Paratypes. ECUADOR. **El Oro:** Guanazán, Los 7 Llanos, X. Cornejo & C. Bonifaz 6090 (GUAY, MO). **Loja:**

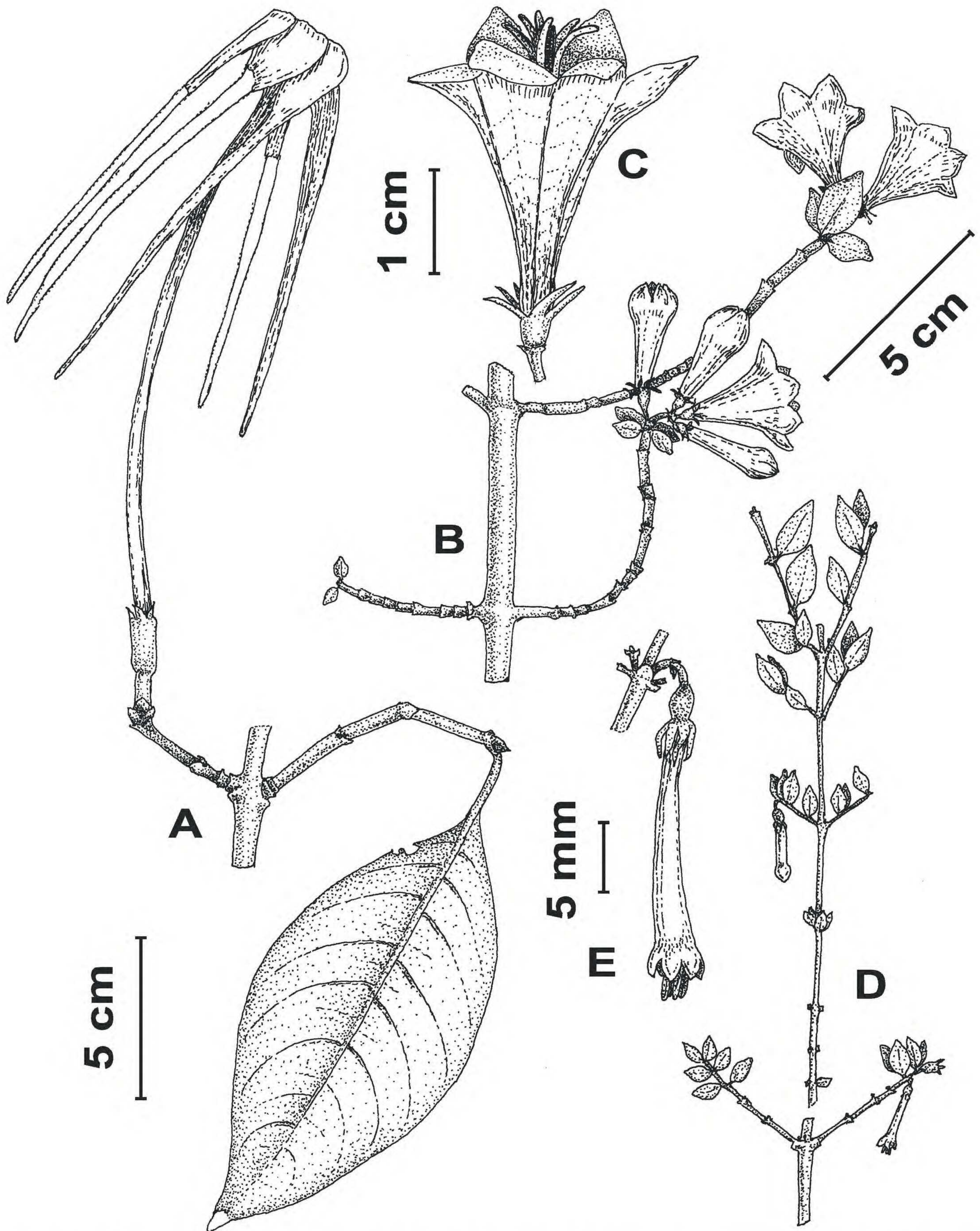


Figure 2. A. *Rosenbergiodendron reflexum* C. M. Taylor & Lorence. —A. Flowering stem; specimen has incomplete flower and leaf, missing parts are interpolated in unshaded areas. B, C. *Coutarea coutaportloides* C. M. Taylor. —B. Flowering stem. —C. Flower and portion of pedicel. D, E. *Coutarea fuchsioides* C. M. Taylor. —D. Flowering stem. —E. Flower, pedicel, and portion of stem with one node and leaf. A based on *Gentry 43707* (MO); B, C based on *Lewis et al. 3683* (K); D, E based on *Jara 55* (MO); B, D to same 5-cm scale.

Saraguro–Celeh, Km 18, *G. P. Lewis, B. Merino & N. Aguirre* 3683 (K).

2. *Coutarea fuchsioides* C. M. Taylor, sp. nov.

TYPE: Peru. La Libertad: Prov. Pataz, rd. (Huamachuco to) Chagual–Pataz, after Chagual, 7°49'S, 77°38'W, 1799 m, 21 Apr. 2004, *M. Weigand & C. Schwarzer* 7917 (holotype, USM; isotypes, BSB not seen, MO). Figure 2D, E.

Haec species a congeneris foliis floribusque plerumque a brachyblastis lateralibus productis atque corolla rubra actinomorpha anguste tubulari distinguitur.

Shrubs flowering at 1.5–3 m tall; stems subterete, glabrous; lateral short-shoots 0.5–6 cm, sometimes spinescent. *Leaves* subsessile to petiolate, with petioles to 1 mm; blade elliptic to lanceolate or elliptic-ovate, 7–25 × 5–16 mm, base rounded to truncate or cordulate, apex obtuse, drying chartaceous, adaxially glabrous and shiny, abaxially puberulent to glabrescent; secondary veins in 2 to 5 pairs, sometimes with pilosulose domatia, tertiary venation mostly not visible; *stipules* persistent, shortly fused around stem, broadly triangular, 1–3 mm, puberulent to glabrescent, obtuse, entire. *Flowers* solitary, deflexed to pendulous, terminal or axillary; peduncles 3–7 mm, puberulent, with 1 to 3 articulations bearing reduced stipules and bracts or reduced leaves; bracts linear to elliptic, 1.5–6 mm; ovary narrowly elliptic to obovoid, 3–4 mm, puberulent; calyx limb divided essentially to base, puberulent to glabrescent, lobes 7, narrowly triangular to spatulate, 2–4.5 mm, equal to subequal, acute; corolla tubular, externally glabrous, internally glabrous except puberulent in basal 1/3, tube 16–18 mm, 3–4 mm wide at mouth (on dried specimens), lobes 6, ovate to elliptic-ovate, ca. 2 mm, obtuse to rounded; anthers 5, narrowly oblong, ca. 7 mm, with 1–2 mm of tips exerted, with filaments flexuous, inserted at base of corolla, glabrous except puberulent in basal 1/3; stigmas slenderly cylindrical, ca. 5 mm, twisted, with 2 longitudinal grooves, positioned with anthers, with style glabrous. *Immature* fruit obovate in outline, to ca. 6 × 7 mm, glabrous, with stipe or peduncle perhaps elongating during development.

Distribution, habitat, and phenology. *Coutarea fuchsioides* is known from dry scrub forest at 2000–2800 m in northeastern Peru, growing at least sometimes on limestone substrates. It has been collected with flowers in January and April.

IUCN Red List category. This species is documented so far by two collections from separate localities in the dry and seasonal forests of northern Peru, which are not well known botanically; the occurrence of this species in intermediate sites is expected, but currently unknown. If this new species is found in additional sites it could be considered

relatively widespread and well established, but if it is confined to only the known localities, then its population viability may be of concern. Because these considerations counter each other, this species is here considered Data Deficient (DD) according to IUCN Red List criteria (IUCN, 2001).

Discussion. *Coutarea fuchsioides* is distinguished within this genus by its leaves and flowers borne mostly on lateral short-shoots; its rather small leaves (so far as known); its flowers borne singly, variously terminal and axillary, and usually pendulous; and its narrowly tubular red corollas. This species is provisionally classified in *Coutarea* until mature fruits and seeds are available to evaluate this. Its immature fruits are only a little flattened, but this is characteristic of the immature fruits seen on many *Coutarea* specimens of several species, which appear to develop their characteristic lateral compression late in development. In flower shape, color, and orientation this new species is similar to some species of *Fuchsia* L. (Onagraceae); the specific epithet refers to this similarity. Several of the corollas have a longitudinal slit in the basal half, presumably made by flower-piercing birds robbing nectar.

Paratype. PERU. **Ancash:** Prov. Antonio Raimondi, Ranraucru–Chingas, 2800 m, 3 Jan. 2005, *E. Jara* 55 (MO, USM).

PATIMA

Delprete et al. (2005) studied this poorly known genus of low shrubs found in wet forests in the Guianas and concluded that the genus is monotypic and best placed in the Neotropical tribe Hamelieae. *Patima* Aubl. is characterized by its little-branched habit; opposite leaves with interpetiolar triangular stipules that often persist with the leaves; few-flowered axillary inflorescences; flowers with a well-developed subglobose hypanthium and truncate calyx limb; salverform yellow to pale green corollas with five to seven ovate, valvate lobes; 5- or 6-locular ovaries with numerous ovules; and subglobose baccate fruits. Delprete et al. noted for the first time the presence of raphides in *Patima*, as well as their limited distribution within the tissues of the plant. Their placement of this genus in Hamelieae expanded the morphology of the tribe to include valvate corolla lobes, which had not previously been reported (Lorence & Dwyer, 1988; Delprete, 1998). However, the corolla lobe arrangement of *P. guianensis* Aubl. could also be considered as valvate-reduplicate (Taylor, pers. obs.). Delprete et al. described the inflorescences as “supranodal, sessile, fasciculate” (2005: 109), but they appear to be placed directly in

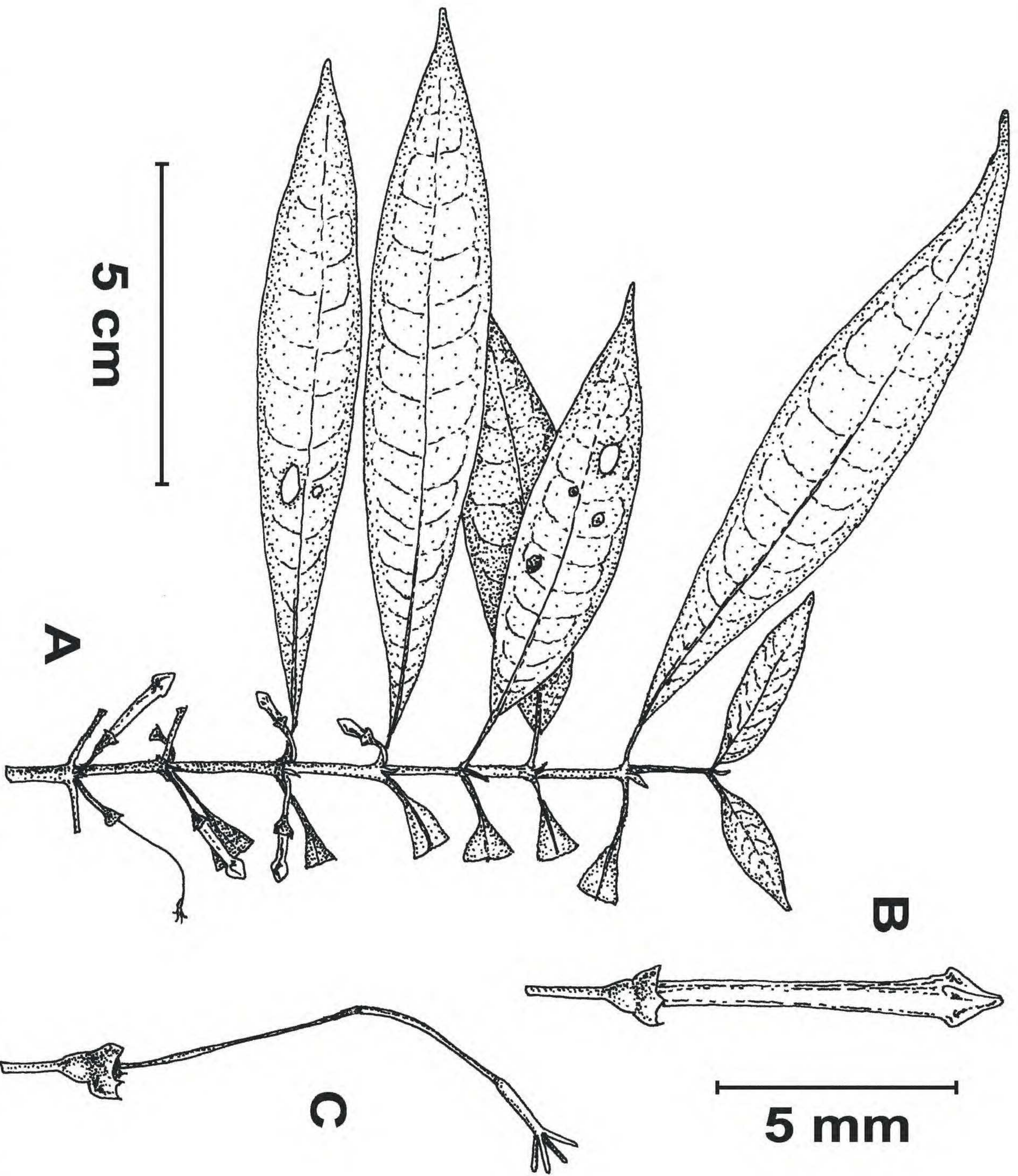


Figure 3. *Patima minor* C. M. Taylor. —A. Flowering stem. —B. Flower bud with portion of pedicel. —C. Portion of dissected flower, showing pedicel, calyx limb, style, and stigmas. Based on *Henkel et al.* 4355 (MO); B, C to same 5-mm scale.

the leaf axil on at least some specimens of *P. guianensis* (e.g., *McDowell & Gopaul* 3622A, MO; *de Granville et al.* 5829, MO) and to sometimes be cymose with reduced axes (e.g., *de Granville et al.* 5829, MO). The inflorescences are bracteate, although the bracts are usually reduced.

Several recent collections from Guyana represent a second species of *Patima*, described below, and thus double the number of species in this genus. This new species has four stigmas and apparently sometimes four calyx teeth, and increases the known range of number of flower parts in *Patima*. This new species is found in the same region as *P. guianensis* and can be distinguished from *P. guianensis* as outlined in the key below.

KEY TO SPECIES OF *PATIMA* IN THE GUIANAS

- 1a. Stems of flowering branches stout, 3–6 mm diam., somewhat succulent, markedly hollow; petioles 55–130 mm long; leaf blades 18–53 × 7.5–22 cm;

- calyx limb 2–3 mm long; plants of lower elevations, 80–760 m *P. guianensis*
 1b. Stems of flowering branches slender, 2–3 mm diam., hardly succulent, solid or mostly solid; petioles 8–20 mm long; leaf blades 7–13 × 1.5–2.2 cm; calyx limb 1–1.1 mm long; plants of middle elevations, 975–1450 m
 *P. minor* C. M. Taylor

1. *Patima minor* C. M. Taylor, sp. nov. TYPE: Guyana. Potaro-Siparuni: Pakaraima Mtns., Mt. Wokomung, toe slope 0.5–2 km NW from N escarpment, 5°04'N, 59°53'W, 1300–1400 m, 13 Nov. 1993, *T. W. Henkel, R. Williams, S. Fratello & L. Williams* 4355 (holotype, MO 5000774; isotype, US not seen). Figure 3.

Haec species a *Patima guianensi* Aubl. statura foliisque minoribus atque limbo calycino brevioribus distinguitur.

Shrubs to 3 m tall; flowering stems 2–3 mm diam., moderately to densely strigillose. *Leaves* opposite;

blade narrowly oblanceolate to narrowly elliptic, 7–13 × 1.5–2.2 cm, drying papyraceous to chartaceous, adaxially sparsely strigillose to strigose, abaxially puberulent to strigillose and perhaps paler when alive, base acute, apex acute and sometimes rather falcate; secondary veins in 12 to 13 pairs, usually looping to interconnect near margins; *petioles* 8–20 mm, hirtellous; *stipules* interpetiolar, narrowly triangular to acicular, 4–5.5 mm, strigillose, persisting on upper nodes but deciduous before leaves fall. *Flowers* solitary in each axil; peduncles 6–12 mm, strigillose; bracts triangular, 0.5–1 mm; hypanthium portion turbinate, 1–1.3 mm, puberulent to hirtellous; *calyx* limb 1–1.1 mm, puberulent, 4- to 5-denticulate; *corolla* in bud salverform, greenish yellow, glabrous internally and externally, tube to 18 mm, lobes 4, ovate, to 2 mm, acuminate to aristate at apex; stamens in bud to 2 mm; style ca. 20 mm; stigmas 4, linear, ca. 2 mm. Young *fruit* subglobose to ovoid, 3–3.5 mm diam., strigillose; *seeds* ca. 0.5 mm diam.

Distribution, habitat, and phenology. *Patima minor* is known from cloud forest on sandstone substrates at 975–1450 m in the Pakaraima Mountains of western Guyana. It has been collected with flowers in February and November, and with young fruits in July.

IUCN Red List category. This new species is documented so far by several collections from separate localities in the mountains of western Guyana, which are not well known botanically. This species may be rare in its range, but it is a plant of low stature and may have been overlooked. Because no more conclusive information is available, this species is here considered Data Deficient (DD) according to IUCN Red List criteria (IUCN, 2001).

Discussion. This new species can be separated from *Patima guianensis* by its much smaller leaves and shorter calyx limb; the specific epithet refers to this difference. All the corollas seen are in bud, but the type specimen also has an apparently mature style that has persisted after the corolla fell off. Delprete et al. (2005) noted that the stigmas of *P. guianensis* are situated in the corolla throat; if the stigma position is similar in *P. minor*, then the corolla tube can be inferred to be ca. 20 mm long and the flower buds seen are nearly mature. In this case, the two species of *Patima* also apparently differ in corolla lobe length, ca. 20 mm long or perhaps a bit longer in *P. minor* versus 5.5–6.5 mm long in *P. guianensis*.

Paratypes. GUYANA. **Potaro-Siparuni:** Pakaraima Mtns., Mt. Wokomung, upslope to NE 1–2 km from headwaters of Wusupubar Creek, 5°03'N, 59°53'W, 975–1125 m, 16 Feb. 1993, T. W. Henkel, M. Chin & W. Ryan

4355 (MO, US); 1.5 km NE of Mt. Wokomung, slopes above second of four escarpments, 5°48'N, 59°51'W, 1450 m, 7 July 2003, H. D. Clark, R. Williams, C. Perry, E. Tripp, J. Kelly, D. Gittens & S. Stern 10638 (MO, US).

ROSENBERGIODENDRON

Gustafsson (1998) nicely clarified the delimitation and characters of this Neotropical genus, and recognized three species of unarmed shrubs and small trees found in both evergreen and seasonal forest from southern Central America to central South America. *Rosenbergiodendron* Fagerl. has sometimes been combined or confused with *Randia* and several other genera of the tribe Gardenieae. These all share opposite decussate leaves; generally well-developed, persistent, triangular stipules; white, often nocturnal flowers, with usually well-developed tubular calyx limbs that persist on the fruits; hypocrateriform corollas with lobes that are convolute in bud; and relatively large, fleshy, indehiscent fruits with numerous seeds embedded in a gelatinous pulp. *Rosenbergiodendron* can be distinguished by the combination of its lack of spines, bisexual 5-merous flowers borne singly on terminal and pseudoaxillary (i.e., lateral) short-shoots, pollen in monads, parietal placentation, and immature fruits that are (so far as known) green marked with white longitudinal stripes. *Rosenbergiodendron* is similar to *Sphinctanthus* Benth.; *Sphinctanthus* (as currently circumscribed) differs in its flowers borne on developed stems, axile placentation, and immature fruits apparently uniformly green (Taylor et al., 2004). Most other Neotropical genera of Gardenieae differ in their unisexual flowers borne on dioecious plants and their staminate flowers borne in cymose groups. Generic delimitation within this tribe is complicated and not yet stable, but the separation of *Rosenbergiodendron* seems well supported (Persson, 2000).

Rosenbergiodendron is notable for its relatively large, white, nocturnal flowers. In the smallest flowers of the genus, in *R. densiflorum* (K. Schum.) Fagerl., the corolla tubes are 3–6.5 cm and the lobes 1.2–3 cm long; the largest corollas are those of *R. longiflorum* (Ruiz & Pav.) Fagerl., with the tubes 12–30 cm and the lobes 3–12 cm long (Gustafsson, 1998). There is marked variation in corolla size within an individual species of *Rosenbergiodendron*, similar to that found in some other nocturnally flowering Rubiaceae, e.g., *Hillia* Jacq. (Taylor, 1994). In previously described species of *Rosenbergiodendron*, the corolla lobes are much less than half as long as the tube; the new species described here has corolla lobes about half as long as the corolla tube. This new species will key out to *Rosenbergiodendron* in recent Neotropical floras (e.g., Taylor et al., 2004) and is provisionally

classified here pending study of additional specimens and a better understanding of this complicated tribe (e.g., Persson, 2000).

1. *Rosenbergiodendron reflexum* C. M. Taylor & Lorence, sp. nov. TYPE: Peru. Madre de Dios: Cocha Cashu Biol. Station, Manu Natl. Park, 11°52'S, 71°22'W, 400 m, 20 Aug. 1983, A. Gentry 43707 (holotype, MO 4624983). Figure 2A.

Haec species a congeneris petiolis bene evolutis, fructu grandi subglobozo atque lobis corollinis sat longis valde reflexis distinguitur.

Small trees, flowering at 3–4.5 m tall; stems flattened to terete, glabrous; short-shoots congested to well developed, each with basalmost node 0.1–6 cm. *Leaves* opposite; blades elliptic, 12–28 × 4–12 cm, base cuneate to acute, apex acute to shortly acuminate, drying thickly papery, adaxially glabrous, abaxially glabrous or sparsely strigillose on midrib; secondary veins in 8 to 12 pairs, without domatia, adaxially venation plane or midrib a little thickened, abaxially midrib and secondary veins prominent, intersecondary and tertiary veins visible and flat to prominulous, higher-order venation not visible; *petioles* 1.5–3.2 cm; *stipules* shortly fused at base, with interpetiolar portion broadly triangular, 4–7 mm, glabrous, obtuse, with apiculate triangular tip 1–2 mm, this terminal or inserted shortly below stipule apex abaxially. *Flowers* bisexual, solitary, sessile, terminal on short-shoots, subtended by 2 or 3 pairs of leafless stipules; ovary portion cylindrical to ellipsoid, moderately to densely puberulent-strigillose, 1.2–1.5 cm; calyx limb externally puberulent-strigillose, with tube 11–13 mm, lobes 5, linear, 4–10 mm; corolla salverform, white, externally moderately to densely puberulent-strigillose, tube ca. 21 cm, 4–5 mm diam. near middle, lobes 5, narrowly triangular, ca. 13.5 cm (possibly longer, but tip broken off on specimens seen), ca. 17 mm wide near base, 1–2.5 mm wide in upper half, acute; anthers and stigmas not seen. *Fruit* ellipsoid, ca. 9 × 6 cm in life, ca. 5.5 × 4 cm when dry, smooth or with 10 narrow low longitudinal ridges, white sometimes with longitudinal green lines or ridges at maturity becoming yellow sometimes with dark yellow lines or ridges; seeds ellipsoid, flattened, 8–10 mm.

Distribution, habitat, and phenology. *Rosenbergiodendron reflexum* is known from wet forest on alluvial floodplains and nonflooded hillsides at 350–1100 m in southeastern Peru and perhaps adjacent western Brazil. It has been collected in bud and flower in July, August, and October, and in fruit in March.

IUCN Red List category. This new species is documented so far by four or perhaps five collections from separate localities in wet forests of the southwestern Amazon basin, which are not well known botanically; the occurrence of this species in intermediate sites is expected, but currently unknown. If this new species is found in additional sites, it could be considered relatively widespread and well established, but if it is confined to only the known localities, then its population viability may be of concern. This species apparently produces relatively few nocturnal flowers of probably short duration, and it may have been overlooked by some collectors. Because no more conclusive information is available, this species is here considered Data Deficient (DD) according to IUCN Red List criteria (IUCN, 2001).

Discussion. *Rosenbergiodendron reflexum* is distinguished from the other species of the genus by its well-developed petioles, relatively large subglobose fruits, and relatively long corolla lobes that are strongly reflexed at anthesis. The species epithet refers to the attitude of the corolla lobes. The remaining species of *Rosenbergiodendron* have sessile or subsessile leaves or petioles up to 1 cm long, fruits that are cylindrical or subglobose and 1–2 cm long, and corolla lobes 1.2–12 cm long and spreading to somewhat reflexed. The label data of Gentry 43703 report the “fruits striped green and orangish cream”; presumably those are young fruits in the process of ripening, but the specimen seen has only flower buds. Only one specimen, the holotype, has a nearly complete flower at anthesis; to avoid damaging it, this flower was not dissected so the anthers, stigmas, and internal corolla pubescence are not described here. The combination of white, apparently nocturnal flowers and corolla with an exceptionally long slender tube suggests pollination by hawkmoths.

Paratypes. PERU. **Cusco:** Prov. Paucartambo, Dpto. Kosñipata, Quebrada Sacharacayo, R. Vásquez, C. Davidson, S. Davidson [sic; S. Christoph], J. Farfán, E. Suelli & A. Peña (AMAZ, MO). **Madre de Dios:** Manu Natl. Park, Cocha Juarez, R. B. Foster 13300 (F, MO); Cocha Cashu Biol. Station, A. Gentry 43703 (MO); Cocha Otorongo Plot, P. Núñez, J. Terborgh, et al. [sic on label, other collectors not named] 14486 (MO). **Puno:** Prov. Sandia, betw. R. Azata-Colorado, P. Núñez & C. Muñoz 5257 (MO). **Ucayali:** Prov. Coronel Portillo, Dpto. Iparía, cuanca del Río Iparía, ca. de la comunidad nativa Ashaninka de Miraflores, J. G. Graham & J. Schunke Vigo 4506 (F, MO), 4277 (F, MO).

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